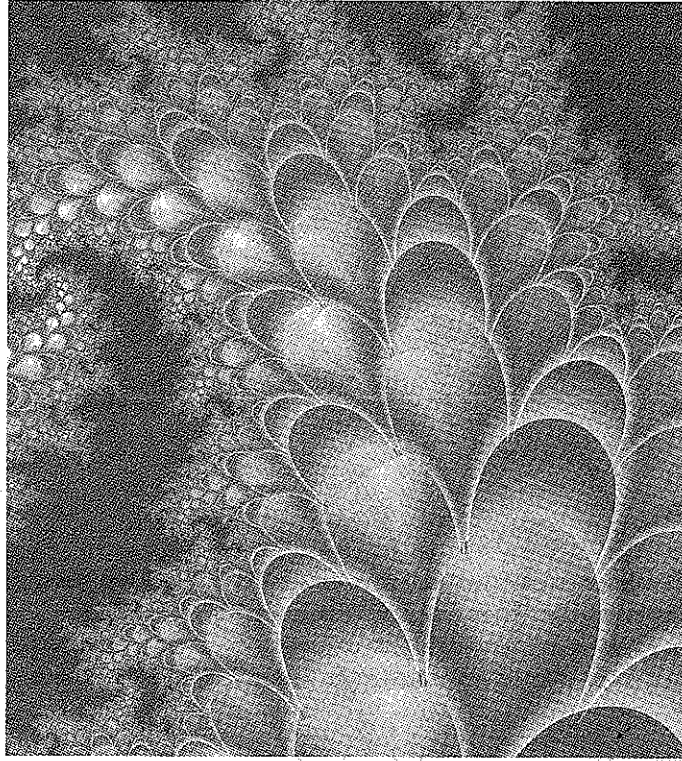


Parrot Fire Kris Northern



"Rather than zoom into the fractal you can zoom into the edge of it and continually find the same pattern repeating itself much like the shoreline of a lake viewed from a plane."— Kris Northern

Investigations

IN NUMBER, DATA, AND SPACE®

Student Activity Book

Many of the designations used by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book, and Scott Foresman was aware of a trademark claim, the designations have been printed with initial capitals and in cases of multiple usage have also been marked with either ® or ™ where they first appear.



Editorial offices: Glenview, Illinois • Parsippany, New Jersey • New York, New York
Sales offices: Boston, Massachusetts • Duluth, Georgia
Glenview, Illinois • Coppell, Texas • Sacramento, California • Mesa, Arizona



The Investigations curriculum was developed by TERC, Cambridge, MA.



This material is based on work supported by the National Science Foundation ("NSF") under Grant No. ESI-0095450. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

ISBN: 0-328-24066-4

ISBN: 978-0-328-24066-1

Second Edition Copyright © 2008 Pearson Education, Inc.

All Rights Reserved. Printed in the United States of America. This publication is protected by Copyright, and permission should be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form by any means, electronic, mechanical, photocopying, recording, or otherwise. For information regarding permission(s), write to: Permissions Department, Scott Foresman, 1900 East Lake Avenue, Glenview, Illinois 60025.

8 9 10-V031-15 14 13 12 11 10 09

CC:N3

UNIT 1

Number Puzzles and Multiple Towers **1-72**

UNIT 2

Prisms and Pyramids **1-50**

UNIT 3

Thousands of Miles, Thousands of Seats **1-69**

UNIT 4

What's That Portion? **1-70**

UNIT 5

Measuring Polygons. **1-63**

UNIT 6

Decimals on Grids and Number Lines. **1-66**

UNIT 7

How Many People? How Many Teams? **1-71**

UNIT 8

Growth Patterns **1-65**

UNIT 9

How Long Can You Stand on One Foot? **1-51**

1. The first part of the report is a general introduction to the subject.

2. The second part is a detailed description of the methods used.

3. The third part is a discussion of the results obtained.

4. The fourth part is a conclusion and summary of the work.

5. The fifth part is a list of references.

6. The sixth part is a list of figures.

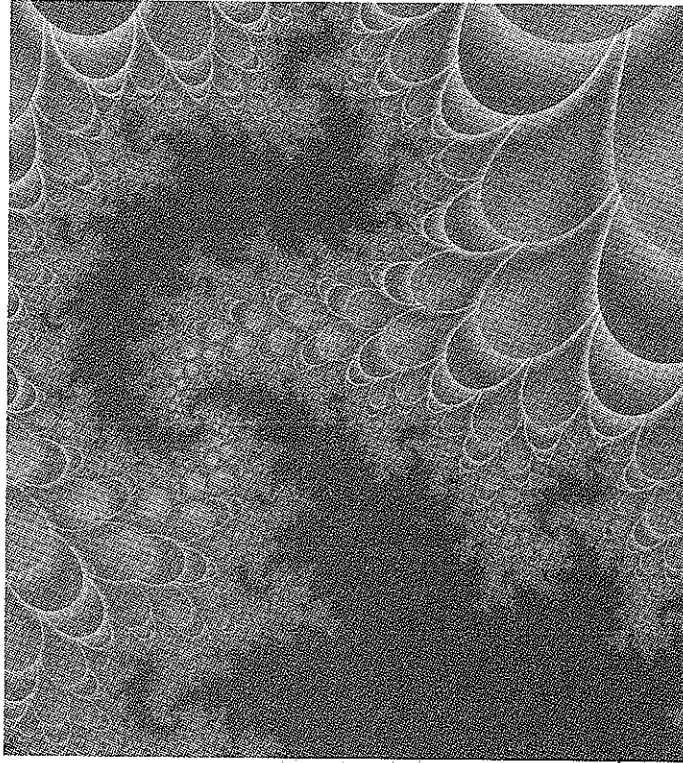
7. The seventh part is a list of tables.

8. The eighth part is a list of appendices.

9. The ninth part is a list of footnotes.

10. The tenth part is a list of errata.

Parrot Fire Kris Northern



"Rather than zoom into the fractal you can zoom into the edge of it and continually find the same pattern repeating itself much like the shoreline of a lake viewed from a plane." – Kris Northern

Investigations

IN NUMBER, DATA, AND SPACE®

Student Activity Book

Number Puzzles and Multiple Towers

Investigation 1

<i>Number Puzzles: 1 Clue</i>	1
Factors and Multiples Daily Practice	3
Seeing Number Dot Patterns Homework	4
<i>Number Puzzles: 2 Clues</i>	5
Computation Practice: Adding Two Ways Daily Practice	7
<i>Number Puzzles</i> Recording Sheet	8
Multiplication Combinations 1 Homework	9
Multiplication Combinations Recording Sheet Homework	10
<i>Number Puzzles</i> Daily Practice	11
Multiplying to Make 18 and 180	12
Factors of 2-Digit Numbers Daily Practice	13
Multiplication Combinations 2 Homework	14
All of the Ways to Multiply	15
Factors of 3-Digit Numbers Daily Practice	16
Multiplication Combinations 3 Homework	17
Multiplication Combinations for 120, 180, and 210	19
Factors and Multiples of 3-Digit Numbers Daily Practice	21
Multiplication Combinations 4 Homework	22
Multiplying to Make 60 and 90 Daily Practice	23
Multiplication Combinations 5 Homework	24

Investigation 2

Multiplying 2-Digit Numbers Daily Practice	25
Factors of 50 and 72 Homework	26
Solving Multiplication Problems	27
Multiplying Two Ways Daily Practice	28
Multiplication Practice Homework	29

UNIT 1 CONTENTS (continued)

<i>Multiplication Compare</i> Recording Sheet	31
More Multiplying Two Ways Daily Practice.	32
Which Is Greater? Homework.	33
Multiplication Cluster Problems	35
Problems Involving Teams	36
More Multiplying 2-Digit Numbers Daily Practice.	37
Many Ways to Multiply Homework	38
More Multiplication Cluster Problems	39
Computation Practice: Subtracting Two Ways Daily Practice	40
Starter Problems	41
Computation Practice: Addition and Subtraction Daily Practice	43
More Starter Problems	44
"How Far?" Problems Daily Practice	46

Investigation 3

Dividing by 2-Digit Numbers Daily Practice.	47
Solve in Two Ways Homework	48
Problems about Multiples of 21	49
Story Problems: Reading a Long Book Daily Practice	51
Solving $315 \div 21$ Homework	52
Division Problems	53
Story Problems: School Supplies Daily Practice	54
Numbers Off the Tower	55
Story Problems: Stamp Collection Daily Practice	56
Multiple Tower for 15 Homework	57
Division Cluster Problems	59
Division Daily Practice	61
Division Practice Homework	62
<i>Division Compare</i> Recording Sheet	63
Problems about <i>Division Compare</i>	64
Solving Division Problems	65

UNIT 1 CONTENTS

Story Problems: Selling Fruit	Daily Practice	67
Practicing Multiplication and Division	Homework	69
Coin Jars	Daily Practice	71
Multiple Towers and Filmmaking	Daily Practice	72

Number Puzzles: 1 Clue (page 1 of 2)

For each number puzzle, follow these steps.

- Find two numbers that fit each clue.
- Draw rectangles, and label the dimensions to show that your numbers fit the clue.
- List other numbers that also fit the clue.

1. This number of tiles will make a rectangle that is 2 tiles wide.

Number: _____

Number: _____

Rectangle: _____

Rectangle: _____

What other numbers fit this clue? _____

2. This number of tiles will make a rectangle that is 5 tiles wide.

Number: _____

Number: _____

Rectangle: _____

Rectangle: _____

What other numbers fit this clue? _____

3. This number of tiles will make only one rectangle.

Number: _____

Number: _____

Rectangle: _____

Rectangle: _____

What other numbers fit this clue? _____

Number Puzzles: 1 Clue (page 2 of 2)

4. This number of tiles will make a square.

Number: _____

Number: _____

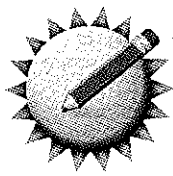
Rectangle: _____

Rectangle: _____

What other numbers fit this clue? _____

5. There are some numbers that can be made into only one rectangle (Problem 3). Find all of these numbers up to 50.

6. There are some numbers that can make a square (Problem 4). Find all of these numbers up to 100.



Factors and Multiples

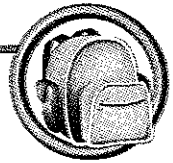
NOTE Students find factors and multiples of 2-digit numbers.

SMH 18-19

1. List all of the factors of 42.
2. List five multiples of 42.
3. Explain the difference between a *factor* and a *multiple*.

Ongoing Review

4. Which number is **not** a factor of 36?
- A. 4 B. 8 C. 9 D. 12
5. Which number **is** a multiple of 36?
- A. 200 B. 108 C. 76 D. 48



Seeing Number Dot Patterns

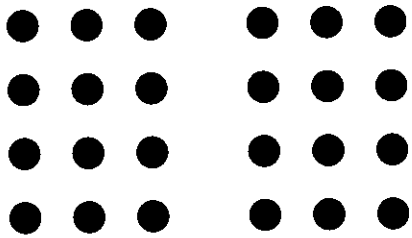
Look at each picture in different ways.
Write equations to show different ways to
multiply that you can see in the picture.

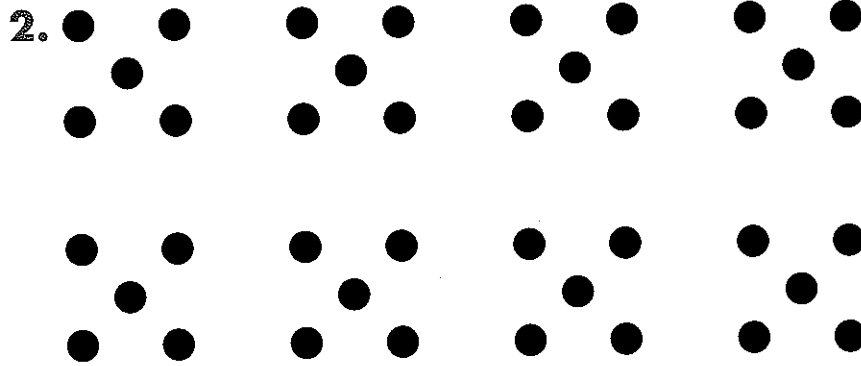
NOTE Students are beginning a new Investigation, a review of multiplication. For each picture below, they write multiplication equations representing different ways to find the number of dots.

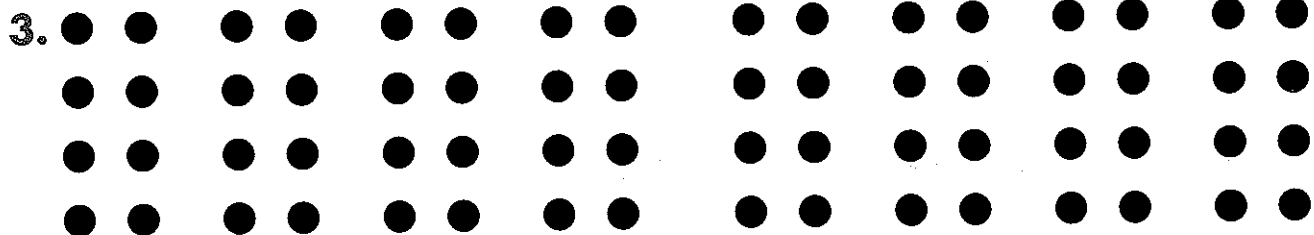


23-24

1.  Example $5 \times 3 \times 2 = 30$







Number Puzzles: 2 Clues (page 1 of 2)

For each number puzzle, follow these steps.

- Find two numbers that fit both clues.
- Draw rectangles, and label the dimensions to show that your numbers fit both clues.
- List other numbers that also fit both clues.

1.

This number of tiles
will make a rectangle
that is 2 tiles wide.

and

This number of tiles
will make a rectangle
that is 4 tiles wide.

Numbers: _____

Rectangles:

What other numbers fit this clue? _____

Number Puzzles: 2 Clues (page 2 of 2)

2.

This number of tiles
will make a rectangle
that is 3 tiles wide.

and

This number of tiles
will make a rectangle
that is 4 tiles wide.

Numbers: _____

Rectangles:

What other numbers fit this clue? _____

3.

This number of tiles
will make a rectangle
that is 20 tiles wide.

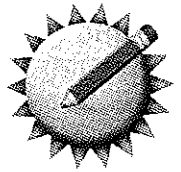
and

This number of tiles
will make a rectangle
that is 25 tiles wide.

Numbers: _____

Rectangles:

What other numbers fit this clue? _____



Computation Practice: Adding Two Ways

Solve this problem in two different ways.
Be sure to show how you got your answer.

$$1,018 + 879 = \underline{\hspace{2cm}}$$

First way:

Second way:

NOTE Students practice strategies for solving addition problems. They work on efficiency and flexibility by solving the same problem in two different ways.

SMH 8-9

Name _____

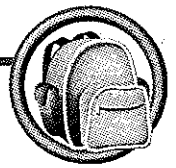
Date _____

Number Puzzles and Multiple Towers**Number Puzzles** Recording Sheet

Check off each puzzle you solve. Record your answer.

Investigation 1 Number Puzzles

✓	Puzzle	Answer
	1	
	2	
	3	
	4	
	5	
	6	
	7	
	8★	
	9★	
	10★	
	11★	
	12★	
	13	
	14	



Multiplication Combinations 1

Multiply each number in the first column of the table with the number at the top. For example, the answer for the first blank space in Table A is 14, which is 2×7 . Circle any combinations you do not know immediately, and record them on *Student Activity Book* page 10.

NOTE Fifth-grade students are expected to know their multiplication combinations (facts). This page helps students determine whether they remember their combinations and identify any combinations they still need to practice.

SMH 25–29

Table A

$\times 7$	
2	14
6	
8	
3	
10	
11	
7	
12	
4	
9	
5	

Table B

$\times 8$	
2	
9	
4	
11	
8	
10	
6	
5	
3	
12	
7	

Table C

$\times 6$	
10	
4	
2	
8	
3	
6	
9	
5	
12	
11	
7	

Table D

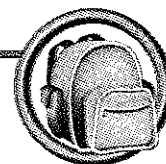
$\times 9$	
5	
2	
12	
4	
10	
7	
3	
6	
11	
8	
9	

Name _____

Date _____

Number Puzzles and Multiple Towers

Homework



Multiplication Combinations

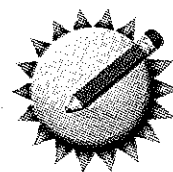
Recording Sheet

Example: $7 \times 9 = 63$ and $9 \times 7 = 63$ **Clue:** $7 \times 10 = 70$ $70 - 7 = 63$

NOTE Fifth-grade students are expected to know their multiplication combinations (facts). On this sheet, students write any combination they still need to practice and a clue to help them learn it. An example is shown on the left.

SMH 25-29

_____ \times _____ = _____ and _____ \times _____ = _____**Clue:** __________ \times _____ = _____ and _____ \times _____ = _____**Clue:** __________ \times _____ = _____ and _____ \times _____ = _____**Clue:** __________ \times _____ = _____ and _____ \times _____ = _____**Clue:** __________ \times _____ = _____ and _____ \times _____ = _____**Clue:** __________ \times _____ = _____ and _____ \times _____ = _____**Clue:** _____



Number Puzzles

NOTE Students solve and create number puzzles to help learn about the composition of numbers.

SMH 21-22

1. Solve the following number puzzle.

Clue 1 This number is a factor of 48.	Clue 2 This number is even.
Clue 3 This number is a multiple of 6.	Clue 4 The sum of the digits of this number equals 3.

What number is it? _____

2. Make up your own number puzzle.

Clue 1	Clue 2
Clue 3	Clue 4

The number is _____.

Ongoing Review

3. Which number fits the following clues?

Clue 1 This number is even.

Clue 2 This number is a factor of 54.

A. 3

B. 6

C. 9

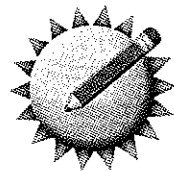
D. 12



1. Find all the multiplication combinations you can for these two numbers, using whole numbers. Start by multiplying two factors. Then find ways to multiply with more than two factors.

[illegible]

2. How did finding the ways to multiply with two numbers help you find ways to multiply with more than two numbers?



Factors of 2-Digit Numbers

NOTE Students find factors of 2-digit numbers.

SMH 18

1. Find all of the factors of 36.

2. Find all of the factors of 72.

3. How are the factors of 36 related to the factors of 72?

Ongoing Review

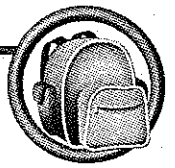
4. Which number is **not** a factor of 124?

A. 31

B. 12

C. 4

D. 2



Multiplication Combinations 2

Multiply each number in the first column of the table with the number at the top. For example, find the product of 3×7 for the first blank space in Table A.

NOTE Fifth-grade students are expected to know their multiplication combinations (facts). This page helps students determine whether they remember their combinations and identify any combinations they still need to practice.

SMH 25-29

In Tables C and D, write a number at the top for a group of combinations you need to practice.

Circle any combinations you do not know immediately, and record them on *Student Activity Book* page 10 or on M30 that your teacher will give you.

Table A

$\times 7$	
3	
6	
9	
2	
4	
10	
8	
12	
5	
7	
11	

Table B

$\times 8$	
2	
7	
3	
5	
6	
10	
8	
11	
12	
4	
9	

Table C

\times _____	
10	
4	
2	
8	
3	
6	
9	
5	
12	
11	
7	

Table D

\times _____	
5	
2	
12	
4	
10	
7	
3	
6	
11	
8	
9	

All of the Ways to Multiply

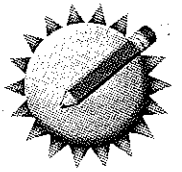
Find all of the ways to multiply to make each product, using whole numbers. First, find the combinations with two factors, and then find ways to multiply with more than two factors.

1.

12**120**

2.

21**210**



Factors of 3-Digit Numbers

NOTE Students find factors of 3-digit numbers.

SMH 18

1. Find all of the factors of 100.
2. Find all of the factors of 200.
3. Did you use the factors of 100 to find the factors of 200? If so, how?

Ongoing Review

4. Which number is **not** a factor of 150?
- A.** 3 **B.** 15 **C.** 75 **D.** 125



Multiplication Combinations 3

Multiply each number in the first column of the table with the number at the top. For example, find the product of 9×6 for the first blank space in Table A.

In Tables C and D, write a number at the top for a group of combinations you need to practice.

Circle any combinations you do not know immediately, and record them on *Student Activity Book* page 10 or on M30 which your teacher will give you.

NOTE Fifth-grade students are expected to know their multiplication combinations (facts). This page helps students determine whether they remember their combinations and identify any combinations they still need to practice.

SMH 25-29

Table A

$\times 6$	
9	
4	
7	
5	
8	
3	
12	
2	
11	
6	
10	

Table B

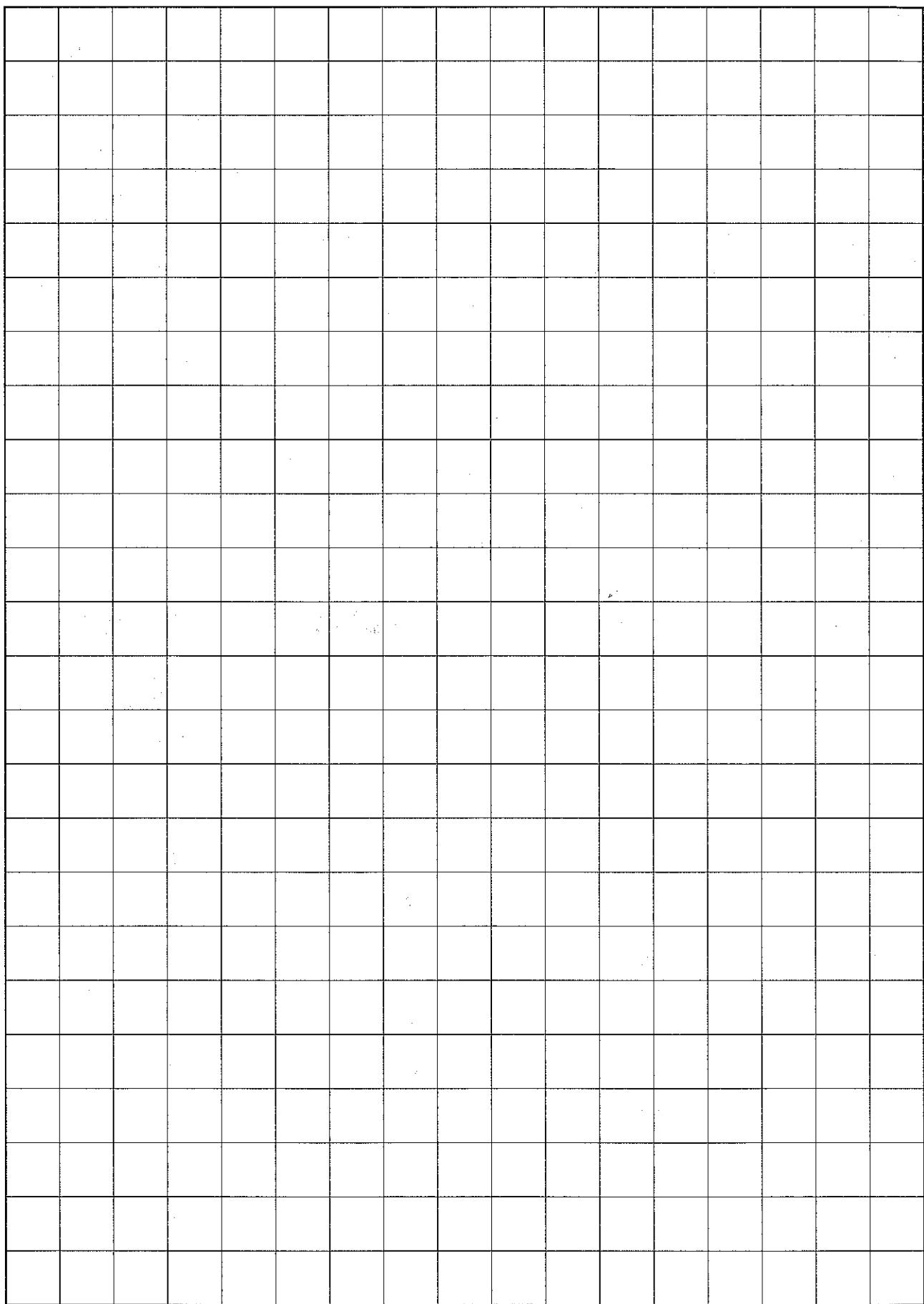
$\times 8$	
4	
5	
3	
2	
6	
10	
7	
12	
8	
4	
9	

Table C

\times _____	
10	
5	
12	
7	
4	
2	
8	
6	
3	
12	
9	

Table D

\times _____	
12	
9	
8	
7	
2	
11	
3	
4	
10	
5	
6	



Multiplication Combinations for 120, 180, and 210

(page 1 of 2)



Think about these questions and give examples from your work on pages 12 and 15 to explain your answers.

1. How did the multiplication combinations you wrote for 12, 18, and 21 help you find some combinations for 120, 180, and 210? Give examples.
2. How did you figure out ways to multiply with three or more factors?
3. How did you know that you found all the possible multiplication combinations for each number?

Multiplication Combinations for 120, 180, and 210

(page 2 of 2)



4. Write the longest multiplication combination you found for each of these numbers.

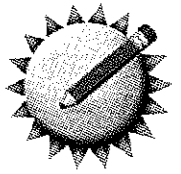
120

180

210

5. Look at the numbers above. Is it possible to find a different way to multiply with the same number of factors as what you wrote in Problem 4? (This does not include multiplying the same factors in a different order.)

How do you know?



Factors and Multiples of 3-Digit Numbers

NOTE Students find factors and multiples of 3-digit numbers.

SMH 18–19

1. Find all of the factors of 150.

2. List five multiples of 150.

Ongoing Review

3. Which multiplication combination equals 300?

A. $2 \times 30 \times 6$

C. $15 \times 2 \times 10$

B. $10 \times 6 \times 20$

D. $2 \times 3 \times 15$



Multiplication Combinations 4

In the top blank in each table, write a number for a group of combinations you need to practice. Then multiply each number in the first column of the table by the number at the top.

NOTE Fifth-grade students are expected to know their multiplication combinations (facts). This page helps students determine whether they remember their combinations and identify any combinations they still need to practice.

SMH 25-29

Circle any combinations you do not know immediately, and record them on *Student Activity Book* page 10 or on M30 which your teacher will give you.

Table A

\times _____	
2	
4	
6	
8	
10	
12	
3	
5	
7	
9	
11	

Table B

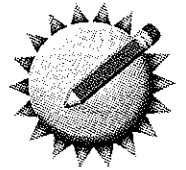
\times _____	
11	
2	
10	
5	
9	
6	
7	
8	
3	
12	
4	

Table C

\times _____	
9	
11	
8	
6	
10	
4	
12	
7	
5	
3	
2	

Table D

\times _____	
5	
9	
2	
12	
3	
8	
6	
4	
7	
11	
10	



Multiplying to Make 60 and 90

Find as many ways as you can to multiply whole numbers to make each product.

NOTE Students find multiplication combinations with two factors and with more than two factors for 60 and for 90.

SMH 23–24

1. Multiplying to make 60

Ways to multiply with two factors:	Ways to multiply with more than two factors:
------------------------------------	--

2. Multiplying to make 90

Ways to multiply with two factors:	Ways to multiply with more than two factors:
------------------------------------	--

Ongoing Review

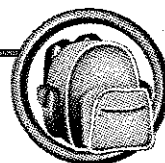
3. Which multiplication combination equals 150?

A. $10 \times 5 \times 10$

C. $25 \times 2 \times 3$

B. $75 \times 2 \times 10$

D. $10 \times 5 \times 5$



Multiplication Combinations 5

In the top blank in each table, write a number for a group of combinations you need to practice. Then multiply each number in the first column of the table by the number at the top.

NOTE Fifth-grade students are expected to know their multiplication combinations (facts). This homework helps students determine whether they remember their combinations and identify any combinations they still need to practice.

SMH 25-29

Circle any combinations you do not know immediately, and record them on *Student Activity Book* page 10 or on M30 which your teacher will give you.

Table A

\times _____	
4	
8	
6	
2	
9	
12	
3	
5	
7	
11	
10	

Table B

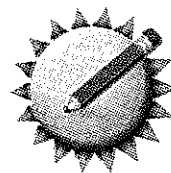
\times _____	
6	
10	
2	
11	
4	
12	
9	
8	
5	
7	
3	

Table C

\times _____	
5	
7	
8	
3	
9	
4	
11	
6	
12	
10	
2	

Table D

\times _____	
3	
5	
2	
6	
9	
10	
4	
11	
12	
8	
7	



Multiplying 2-Digit Numbers

Solve these problems and show your work.

NOTE Students multiply two 2-digit numbers.

SMH 30-32

1. 26×12

2. 18×34

Ongoing Review

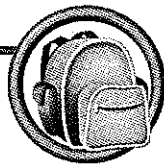
3. $12 \times 18 =$ _____

A. more than 400

B. about 300

C. about 200

D. less than 100



Factors of 50 and 72

Find as many ways as you can to multiply using whole numbers to make each product.

NOTE Students practice finding multiplication combinations with two factors and with more than two factors for 50 and 72.

SMH 23–24

1. Multiplying to Make 50

<p>Ways to multiply with two factors:</p>	<p>Ways to multiply with more than two factors:</p>
---	---

2. Multiplying to Make 72

<p>Ways to multiply with two factors:</p>	<p>Ways to multiply with more than two factors:</p>
---	---

Solving Multiplication Problems

Choose three of these problems to solve. Show your work.
Use clear and concise notation.

After you have solved the problems, pick at least one of your solutions and use a representation to show how you solved it.

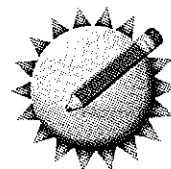
27×19

42×32

76×8

82×56

65×14



Multiplying Two Ways

NOTE Students multiply a 2-digit number in two different ways.

SMH 30-32

1. Solve this problem in two different ways.
Show each solution clearly.

$$26 \times 19 = \underline{\hspace{2cm}}$$

First way:

Second way:

Ongoing Review

2. $6 \times 3 \times 10 \times 2 = \underline{\hspace{2cm}}$

A. 120

B. 300

C. 360

D. 630